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INFLAMMATION

OF THE

# VERMIFORM APPENDIX:

ITS

RESULTS, DIAGNOSIS, AND TREATMENT,

TOGETHER WITH THE

## R E P O R T S

OF SEVEN CASES OF EXCISION OF THE VERMIFORM APPENDIX  
FOR PERFORATIVE APPENDICITIS, WITH EXHIBITION  
OF FIVE OF THE PATIENTS.

BY

THOMAS G. MORTON, M.D.,

One of the Surgeons to the Pennsylvania Hospital; Surgeon to the Philadelphia  
Orthopædic Hospital; Professor of Orthopædic Surgery at the Philadelphia  
Polyclinic and College for Graduates in Medicine, etc., etc.

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Read before the College of Physicians of Philadelphia,  
January 1, 1890.

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PRINTED BY

J. B. LIPPINCOTT COMPANY,

PHILADELPHIA.

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WHEN the abdomen is believed to contain pus, whether intra- or extra-peritoneal, encysted or diffused, the rule of surgical procedure now is to make a section, remove the offending organ or the sloughing tissues or pus, thoroughly cleanse the surroundings, and drain.

This method has also been practised in the treatment of suppurative peritonitis; in perforating ulcer of the intestine, whether typhoid, tubercular, traumatic, or simple in character; and, more recently, in those inflammations and abscesses called perityphlitic or pericæcal, which now are acknowledged to be almost invariably the result of some form of appendicitis. It is to the latter affection that I wish to call attention this evening, and, in doing so, to present a number of patients from whom I have removed a diseased appendix vermiformis, which

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\* Read before the College of Physicians of Philadelphia, at the stated meeting held January 1, 1890.

in every case had given rise to peri-appendicular abscess threatening general suppurative peritonitis, which, indeed, in several had already begun.

Laparotomy for perforative appendicitis, with removal of the organ, is now an established surgical procedure, and yet so recently has this operation been introduced that I am able to present the patient upon whom I operated in April, 1887, for pericæcal abscess with peritonitis, which I believe represents the first successful operation for the removal of the vermiform appendix in a case of this kind, based upon correct diagnosis.

It is true that Hall, of New York, in 1886, in an abscess associated with right inguinal hernia, after evacuating the abscess, had discovered and removed an ulcerated appendix, and the patient recovered; but the diagnosis of perforative appendicitis was not made until after the abscess was opened. More recently, a number of cases of excision of the appendix have been reported by Weir, Treves, Nancrede, and others.

In the case to which I have referred and now present, general peritonitis was developing; the history and symptoms indicated abscess, and pointed to the appendix as the cause of trouble. Upon incision, an abscess cavity was entered at a depth of an inch or more below the external surface, a free flow of pus followed, and the cæcum and its diseased appendix, which was perforated, came into view. The latter was excised, the peritoneal cavity washed free of pus and drained, with immediate relief and prompt recovery.



I have operated since upon six other cases. Of these seven, five recovered and two died; of the latter, both were unavoidably operated upon *in extremis*, and, although dying within a few hours, the fatal termination was in no wise, I think, hastened by the operation.

Each case presented a distinct history of a number of previous attacks of pain in the ileo-cæcal region, which occurred generally at irregular intervals, covering periods varying from a few months to several years.

Four were males, and three were females; their ages were respectively nine, eleven, seventeen, twenty-six, twenty-eight, thirty-four, and fifty-two years. The final attack, during which perforation took place, presented symptoms very much alike in each: intense local pain, increased on pressure, distention of the ileo-cæcal region, fluctuation of temperature, slight rigors or marked chills, moderate or decided sweatings, acceleration of pulse, coated tongue, constipation, and a depressed, anxious facial expression.

No tumor could be detected in any case, but in one instance there was some deep hardening of the tissues. Percussion in this, as in fact in the other cases, was markedly tympanitic.

A lateral incision was made in each, and the peritoneal cavity was found invaded by pus in four of the cases. In all more or less intestine came into view, either as part of the limiting abscess wall or penetrating the opening through it to the general peritoneal cavity. The appendix was found

attached its entire length to the cæcum in three cases, and quite free in the other four.

Fecal concretions were found in every case but one, either lodged in the perforation or free in the abscess or peritoneal cavity.

The abdominal cavity of each was washed out and drained from the lowest part of the pelvis. The abscess cavities were treated by irrigation and partial curetting. The wound of operation was brought together by interrupted sutures of silk, but in each case, owing to increased tension, some of the sutures had to be cut within twenty-four hours, and healing by granulation took place. From the time of operation the symptoms were invariably promptly relieved. Convalescence was uneventful except in one instance, which will be referred to again.

The operations were performed at periods varying from the third to the ninth day after the first symptoms had appeared.

The post-operative treatment consisted, in a general way, in keeping the abdominal cavity drained and the bowels acting freely.

Hypodermic injection of morphine was reluctantly used upon two occasions, shortly after the operation, to relieve pain and restlessness.

Milk and broths were freely given, while stimulants and quinine were early required. The histories of these cases are briefly as follows :

CASE I.—(Exhibited.) APPENDICITIS—PERFORATION—PERITYPHLITIC ABSCESS—GENERAL PERITONITIS—LAPAROTOMY—EXCISION OF THE VERMIFORM APPENDIX—RECOVERY.

This patient was under the charge of Dr. Frank Woodbury, with whom and Dr. James C. Wilson I saw the case in consultation.

Charles M. N. K.; aged twenty-six years; born in Philadelphia; a paper-hanger; not married; of spare frame; had always had good health, except that for the last three or four years he had been subject to sudden and severe attacks of abdominal pain. These attacks came on without warning while he was in excellent health, and would completely prostrate him. The pain was of a stabbing character, and most intense across the lower part of the abdomen and around the umbilicus; it was attended by great irritability of both rectum and bladder; sometimes there would be diarrhœa. These attacks, after lasting a few hours, passed away gradually, leaving him rather weak for a short time; but he rapidly recovered, and enjoyed uninterrupted good health until the next attack came on. He consulted Dr. Woodbury on the 20th of April, 1887, complaining of having taken cold; looked haggard, skin and conjunctivæ rather sallow, tongue coated, no appetite, bowels constipated, frequent micturition, and was passing a remarkably large quantity of pale urine. At this time he did not complain of abdominal pain. He was given fractional doses of calomel and sodium bicarbonate with pepsin, and was directed to keep his room. The urine contained a large proportion of albumen (one-fifth on boiling), and under the microscope showed many leucocytes and a few hyaline casts.

*April 22.*—Nauseated during the night; bowels moved satisfactorily; great irritability of the bladder; much prostration.

*April 23.*—Spent the day lying upon a lounge; complained of abdominal pain; had not slept, and was very restless.

*April 24.*—During the night had suffered intensely and did

not sleep ; several copious movements ; pain persisted ; point of greatest tenderness about midway between the umbilicus and the middle of Poupart's ligament. A resisting mass could be detected upon pressure in this locality, but examination caused severe pain. Temperature 103.5° ; pulse 140.

*April 25.*—Had a very bad night ; pain in right iliac region excruciating ; swelling somewhat larger, very tender ; skin not discolored. Dr. James C. Wilson saw the case in consultation : diagnosis, either intussusception or perityphlitic abscess. Leeches were applied over the spot of tenderness.

*April 27.*—Symptoms continue about the same ; general condition poor ; face pale ; features pinched ; beads of perspiration on forehead. I was called and advised operation. At this time his condition was discouragingly wretched, that of a man in the dying stage of purulent peritonitis. At 2 P.M. performed laparotomy. The field of operation was cleansed with soap and water, and neighboring hair removed ; the surface was again washed with ether, followed by corrosive sublimate solution (1 to 2000). The usual antiseptic precautions were observed as to instruments, and the field was surrounded by towels wet with the mercuric solution. The incision was made directly over the swelling, and, finding the deep muscles infiltrated with pus, it was extended until it measured nearly ten inches ; commencing just above, and two inches to the right of the umbilicus, it continued obliquely downward nearly to the pubes. The peritoneum was opened and a free flow of pus followed, having a decidedly fecal odor ; general purulent peritonitis present. In the abscess cavity, near the appendix, was found a fecal concretion about the size of a cherry-stone. The vermiform appendix was greatly swollen, and exhibited a perforating ulcer extending three-fourths around its circumference, and very near to the point of origin. A silk ligature was applied close to the cæcum and at the terminal portion of the appendix, and the intervening portion, comprising almost the whole organ, was removed, together with a large portion of omentum which projected into the abscess cavity, the walls of which were then scraped with a curette and douched with simple hot (110°) water. The peritoneal cavity was likewise douched

until free of pus, and a drainage-tube was carried into the lowest part of the pelvic basin.

Following the operation, he entered upon convalescence, which was uninterrupted. He was free from all pain; the bowels moved naturally. The temperature fell after the operation, and did not again rise above 100°. The drainage-tube was removed piecemeal, the last portion being taken away on the fifteenth day. Went out May 21st. His recovery was assured by careful nursing, and by the administration of milk and small quantities of prepared liquid foods.

**CASE II.—APPENDICITIS—PERFORATION—PERITYPHLITIC ABSCESS—GENERAL PERITONITIS—ABDOMINAL SECTION—EXCISION OF APPENDIX—DEATH.**

This case I saw in consultation with Dr. Ed. G. Stone, of Philadelphia, and operated upon it for him.

Mrs. G. ; æt. thirty-four ; mother of one child ; had been perfectly healthy up to time of last illness, save for occasional attacks of colic, which had readily yielded to anodynes. It was said that she had had a severe attack of pain and vomiting some months before. For two days previous to February 18, 1887, she severely exerted herself while the menses were overdue. On that day she had severe abdominal pain accompanied by vomiting. The pain was described as starting in the right hypochondriac region and darting to the umbilicus. No tumor was perceptible, neither was there tenderness upon pressure. Anodynes and counter-irritation were ordered. February 19, pain less ; no emesis nor rise of temperature ; some soreness and tenderness to the right of the umbilicus. Pain returns as anodyne effects pass off. Bowels have not moved for several days. Abdomen somewhat tympanitic, tongue coated and dry at tip. Evening temperature, 100° ; pulse 90. Treatment continued.

*February 20.*—Restless night. Vomits yellow material freely.

Abdomen tympanitic and tender. Temperature  $101^{\circ}$ ; pulse 110. Operation urged but refused.

*February 21.*—Symptoms continue. She is more quiet but weaker. Abdomen very large and tender. On the morning of this day I first saw the case, and, although her condition was very unfavorable, urged abdominal section as her only chance for life. My diagnosis was perforated appendix and subsequent peritonitis.

Free incision was made laterally over the cæcal region, and the appendix found greatly enlarged and perforated in two places, each hole measuring a little more than one-fourth inch in diameter. A silk ligature was placed upon the appendix close to the cæcum, and the offending organ then removed. There was also present diffuse purulent peritonitis. The abdominal cavity was thoroughly irrigated, the region of abscess cleansed, and a drain inserted. She died in a few hours.

**CASE III.—APPENDICITIS—PERFORATION—PERITYPHLITIC ABSCESS—GENERAL PERITONITIS—ABDOMINAL SECTION—EXCISION OF APPENDIX—DEATH.**

On the 13th of January, 1888, I was called in consultation with Dr. B. Trautmann, of this city, to a child nine years of age. It seemed that she had suffered from headache, and frequent attacks of pain in the abdomen. She attended school until just before Christmas, when she had a severe colicky attack, but subsequent to this was apparently quite well, and on December 31 was out with her sled for several hours. On January 6 she was seized with nausea, abdominal pains, and developed high fever. After this she was so much better that she was down stairs, and ate of sausage and rolls. Soon after she was seized with violent abdominal cramps, the right iliac region being exceedingly painful. Upon January 12 she had an attack of pain which was most excruciating in character. The following day, when I first saw her, the condition was wretched, almost that of collapse, but not to such an extent as to justify denial of her only chance of life, as I had diagnosed peritonitis originating in a perforated appendix

and advised operation. Upon making lateral abdominal incision, as soon as the peritoneum was opened a great flow of putrid pus took place, then the cæcum and appendix came into view; the latter was greatly swollen, and both it and the cæcum were covered with greenish-yellow pyogenic membrane and lymph. The appendix was gangrenous for some distance, and its end had sloughed off. One foreign body was found in the abscess cavity, another was partly held in the sloughing end of the organ, while two other concretions were in the canal near the cæcum. The appendix was ligatured at its base and excised. The whole abdominal cavity and its intestinal contents, which were in a state of purulent inflammation, were then thoroughly inundated with hot water; a glass tube was carried into the pelvis, and the wound was closed and dressed in the usual manner. The child never reacted fully, but died seven hours afterwards.

**CASE IV.—(Exhibited.) APPENDICITIS—PERITYPHLITIC ABSCESS—INCISION AND DRAINAGE (1886)—RECURRENCE OF APPENDICITIS—PERFORATION—PERITYPHLITIC ABSCESS—ABDOMINAL SECTION—EXCISION OF APPENDIX—RECOVERY (1888).**

L. A. B., a stout girl, of healthy parentage, and with no family history of cæcal or appendicular disease, had a severe fall upon the buttocks in March, 1884. She was almost immediately seized with a terrible attack of vomiting and retching, which lasted hours. From this time until September, 1885, she suffered with extremely painful menstrual epochs, and from time to time, when tired, had a recurrence of vomiting similar to that immediately succeeding her fall. On September 10, during the progress of one of these vomiting spells, she experienced severe pains in the right cæcal region, the whole seizure lasting about ten days. Another attack developed on September 29, and still others on November 10 and 23. The latter was brought on by taking cold, and in five hours she was compelled to go to bed, and endured the most excruciating drawing pain, which radiated from the right cæcal region to the shoulder-blade of the same side. Vomiting continued for some hours. Emesis then ceased, but the

pains continued off and on until January 10, 1886, when I first saw the patient. A hardening was then present in the right ileo-cæcal region. Poultices and mercurial inunctions were ordered, which gave very marked relief. She daily seemed to improve, and before March 19 had resumed her household duties. On that date she was much overworked in caring for company, and about midnight was seized with torturing pains in the region of the hardening. These continued until April 3, 1886, when I incised the now greatly enlarged mass, liberated a large quantity of fetid pus, and introduced a drainage-tube. There was apparently no communication with the cæcum or its appendix. The tube remained for a long time, and the wound did not completely close until August. Her condition, however, had meanwhile improved amazingly, and she was soon quite herself again, being up and about the house in four weeks.

After this, especially when tired out or at a menstrual period, the patient suffered with pain localized about the cæcal region. The attacks resembled colic. Three months after operation she had quite a severe attack of local pain which lasted a number of hours. These attacks, at long intervals, presented about the same characteristics. The last occurred in January, 1888, which was accompanied by more severe pain than any of the others.

During the evening of Friday, March 15, of the same year, she was taken with violent vomiting and purging. These symptoms continued all night, and through Saturday, when the pain was most intense. On Sunday her symptoms appeared grave. Pain was increased on pressure in the right ileo-cæcal region. Abdomen soft; fever; rapid pulse and dry tongue. On Monday the symptoms continued the same, with a temperature of  $102^{\circ}$ . In the afternoon the general symptoms were more serious. No tumor could be felt, pain increased. Skin was bathed with sweat. There was marked resonance over the part. On Tuesday the pulse was feeble, nausea and occasional sick stomach prevailed. The other symptoms remained about the same; diagnosis of perforated appendix with abscess was then made. The same morning



she was etherized and the usual lateral incision, five inches long, was made. This came about an inch further externally than the line of incision of the first operation. The deep tissues of the abdominal wall were somewhat œdematous, and just before the peritoneum was reached a large quantity of most fetid pus was liberated. At the base of this cavity the cæcum and appendix were clearly visible. The latter was enormously enlarged and thickly covered with lymph and abscess-lining membrane. A large opening in the abscess wall communicated with the cavity of the general peritoneum. Through this small intestines were forced when she coughed.

The appendix was firmly attached to the cæcum, from which it was separated with some difficulty. It was then firmly ligatured with a stout silk at its junction with the cæcum and excised. The communication with the general peritoneum was then enlarged by tearing, and through it the intestines were most thoroughly washed by means of hot water irrigations. The abscess cavity proper and surrounding parts were sponged with one to one thousand mercuric solution. A glass drainage-tube was then carried to the bottom of the pelvis and brought out through the lower angle of the wound, while a larger rubber tube drained the abscess cavity proper and emerged at the upper extremity of the wound.

The incision was then closed and an antiseptic dressing applied. She reacted well. On the following day immense swelling necessitated cutting of all the stitches, whereupon the cæcum lay in full view at the bottom of the wound, but no prolapse of intestine at any time took place.

Great sloughs kept coming away for many days, also much pus, in spite of every effort to keep the wound aseptic. The deep glass or pelvic drain became dry on the fourth day and was removed on the fifth. From that time the wound was kept lightly packed with antiseptic material and rapidly granulated to the surface, when a few strips of rubber plaster were applied and cicatrization became complete.

Patient's bowels, from time of operation, were kept in a freely moving condition by means of citrate of magnesia and enemata. In less than a month the patient was well, and has

since married. The appendix was found to be the seat of a very large perforating ulcer, situated near its cæcal attachment, but no foreign body was discovered.

Eighteen months after operation, as result of immense obesity and continued bronchial cough, a hernia of considerable dimensions appeared beneath the double cicatrix. This, however, has not increased in size; is easily kept reduced by a truss, and gives the patient scarcely any annoyance.

**CASE V.—(Exhibited.) APPENDICITIS—PERITYPHLITIC ABSCESS—PERFORATION—LAPAROTOMY—EXCISION OF THE APPENDIX—GANGRENE OF THE CÆCUM—FECAL FISTULA—RECOVERY.**

Seen in consultation with Drs. Rich and Sailor, of Williamsport, Penna.

J. W. C., seventeen years of age, usual weight one hundred and eighty pounds, had a severe attack of ileo-cæcal pain some time in November, 1887, while at school, which laid him up for three days, and in the following spring he had a similar but less severe attack. On July 4, 1888, he indulged in an enormous amount of peanuts and cherries, but felt no special inconvenience, save constipation, until three days subsequently, when he experienced colicky pains and had a somewhat watery stool. For two days there was some looseness of the bowels associated with severe cramps. At this time there developed great tenderness in the right iliac region and he could not stand erect. On July 11, a telegram from Williamsport, Pa., reached me at Newport, R. I., but I was not able to reach the patient until the 13th, when I found him in a most serious condition. Although he had symptoms of obstruction, yet the diagnosis of perforation of the appendix, abscess, and peritonitis was instantly made. The pain, violent variations of temperature, profuse sweating, and profound exhaustion indicated pus, while the previous history of attack of colic and pain in the ileo-cæcal region, all pointed to the appendix as the source of trouble.

I promptly made a lateral abdominal section, evacuated an

abscess of considerable size, and soon came upon a perforated appendix, which was closely attached to the cæcum its entire length. The end of the appendix had sloughed off, and in this disorganized tissue I found a large oval fecal concretion, which evidently had been the cause of the disturbance. Two very large portions of omentum were so constricted by lymph-bands that gangrene had occurred, and there was general peritonitis. The appendix was tied and cut off close to its cæcal attachment; two large portions of the gangrenous omentum were removed, and the abscess cavity cleansed, as were likewise the entire abdominal contents. The cæcum had very much the shape and feel of a sausage, was firm and dark in color, and bound down as the result of inflammation. Thorough drainage of the abdominal cavity was secured by a glass drainage-tube passing to the bottom of the pelvic cavity, while a rubber tube drained the abscess proper.

No attempt was made to approximate the wound, but its cavity was lightly packed with antiseptic gauze, with the usual dressing upon the abdomen.

The patient did fairly well after the operation; took food well, but there was no action of the bowels. Two days later he had marked rise of temperature and great restlessness; passing water frequently, and had almost constant desire to evacuate the bowels, but without succeeding in doing so. In response to a telegram stating that the patient was desperately ill, my son, Dr. T. S. K. Morton, went to Williamsport, and upon examination discovered an impaction of fæces in the large bowel which extended from cæcum to anus. After some twelve hours' work with the rectal tube and half-hourly doses of calomel and podophyllin, the colon was cleared of several pounds of fecal matter, and the patient's condition immediately became much improved, and continued to do so steadily until convalescence took place. At the time of the impaction it was discovered that fecal matter was passing into the abdominal wound, and examination showed that the cæcum had given way, for two gangrenous spots were found, each about half an inch in diameter, on the uppermost part of the exposed bowel. These soon coalesced into one opening. Sub-

sequently the patient rapidly improved and regained his usual rugged health. The wound of operation and fecal fistula closed naturally in five months.

**CASE VI.—(Exhibited.) APPENDICITIS—PERITYPHLITIC ABSCESS—PERFORATION—LAPAROTOMY—EXCISION OF THE APPENDIX—RECOVERY.**

H. A. R., aged fifty-two; has always had good health, with the exception of a mild attack of bronchitis several years ago, which did not confine him to bed. Four months ago he had the first attack of pain in the right ileo-cæcal region; this had since recurred several times. The pains generally awakened him at night, but usually were soon relieved by stimulants. Pressure over the cæcal region always increased his suffering. On September 4 he called upon Dr. Bernard Berens, of this city, and complained of being stiff and sore all over, particularly in thighs and abdomen. His tongue was furred, pulse 72, skin moist. Was ordered calomel and opium. On the 6th he called again, with more abdominal pain which was diffuse, but this time not increased by pressure. Some difficulty in walking and some anorexia were present, but not enough to prevent him from attending to business. On the 7th he again saw Dr. Berens, when his condition was found to be more serious. He had great pain in the abdomen, and now had tenderness on pressure; pulse 72; skin dry; was obliged to leave his business office at noon, and took to bed. At 8.30 that evening he had rigors, but not a full chill; pulse 98, temperature  $102\frac{2}{5}^{\circ}$ , skin hot, tongue dry, abdomen distended, tympanitic, and tender to touch over its entire surface. On the 8th, had passed a good night with morphine; bowels were freely moved by sulphate of magnesia; condition of abdomen unchanged; morning temperature  $100\frac{4}{5}^{\circ}$ ; evening temperature  $103^{\circ}$ . The next day, September 9, condition about the same except increased pain over the appendix region. On the 10th, the morning temperature was  $101^{\circ}$ ; pulse 92; facial appearance dusky; pain especially severe in right iliac region with well-defined fulness, and intense pain on pressure at that point.

From the intense pain, more especially over the appendix, the slight sweat, the fluctuating temperature, the anxious facial expression, depressed appearance and gradual increase of symptoms, the diagnosis of typhlitic abscess and peritonitis was made. At 12.30, the same day, I saw the patient, confirmed the diagnosis, and at once made preparations for evacuating the abscess and excising the appendix, which was believed to be the subject of perforation. At 4.30 P.M., the usual lateral incision was made, six inches in length, directly over the site of the appendix. The abdominal walls were very thick, and it was not until the cæcum was reached that pus was found. This was exceedingly offensive and in considerable amount. It had worked its way into the right side of the pelvis. With some difficulty the under surface of the cæcum was brought into view and two very similar masses of tissue, either one of which might, from its appearance, have been taken for the appendix, were found lying near each other and quite firmly attached to the under part of the cæcum. These masses seemed made up of fat and cellular tissue, and were about two inches long, judging from the position of the one nearest the caput coli, and the position the appendix should occupy, this one was carefully separated from the intestine, and a ligature placed upon it as near its cæcal attachment as possible, and it was then cut off. It proved to be the appendix embedded in lymph. A ragged perforation was found in it about one-fourth of an inch from its distal end. The second intestinal appendage proved to be an hypertrophied epiploic body. There was considerable recent lymph surrounding the appendix and colon. The exposed parts were carefully curetted and douched. During the search for the appendix, and subsequently in the course of the operation, intestines protruded considerably. The abdominal cavity was very thoroughly washed out; and, subsequently, a glass drainage-tube was placed at the bottom of the pelvis, a large rubber drain was also placed up along the ascending colon. With some difficulty the intestines were returned, and the wound was finally brought together with silk thread. The temperature, three hours after the operation, was  $101\frac{1}{2}^{\circ}$ ,

but gradually lessened, never reached 101° again, and on the tenth day was normal.

Three hypodermic injections of one-sixth of a grain of morphine were administered to relieve pain, two at intervals of five hours after the operation, and the last one eight hours subsequently. Calomel in doses of one-sixth of a grain was given every hour after operation until the bowels moved very freely. Milk, coffee, and champagne, in small and frequently repeated doses, were given from the first, also twelve grains of quinine daily.

Great tension of the wound necessitated cutting away the sutures on the second and third days, after which large sloughs kept coming away for ten days. Healing by granulation took place. Glass drain worked out on twelfth day; the rubber one on the fifth day.

The wound was dressed and fresh cotton placed in the glass drain every four hours for the first five days, and gradually the dressings were changed morning and evening only, until final cicatrization occurred.

Convalescence was uneventful and rapid.

**CASE VII.—(Exhibited.) PERFORATIVE APPENDICITIS—ABSCCESS—LAPAROTOMY—EXCISION OF THE APPENDIX—RECOVERY.**

On November 5, 1889, I saw in consultation with Dr. C. H. Shivers, of Haddonfield, New Jersey, and Dr. J. T. Hampton, of this city, Lemuel O., a lad of eleven years of age, who, a few days before, when playing in the garden, had been accidentally struck in the right iliac region by the handle of a spade. Intense pain followed; but the boy was not wholly confined to his bed until the day subsequent to the injury; on the fifth day there was a temperature of 101 $\frac{4}{5}$ °, pulse 120, respiration 44, dry tongue. Right iliac region was very tense, swollen, and exceedingly painful to the merest touch; there was no pain in any other part of the abdomen, no localized tumor, and not the least dulness on percussion; the bowels had been kept open by salines. The boy had two days before a slight but positive rigor, which

was followed by decided perspiration; careful inquiry brought out the fact that, on very many occasions during the previous two or three years, he had had sudden attacks of colic, which had been ascribed to "internal hernia." The pain had always been located in the appendix region. During the intervals of the attacks he had been quite well. With this history, I felt convinced that there had been chronic appendicitis, with probably a foreign body in the organ, and that the injury produced by the blow of the spade-handle had lighted up an attack of acute inflammation in the already diseased appendix, which, becoming ulcerated, had ended in perforation; and although all the symptoms of abscess were not present, yet that unquestionably pus had formed, and, since the patient had progressively grown worse, danger of extension of inflammation or of the abscess opening into the peritoneal cavity was very great. Hence I was able to confirm Dr. Shivers's able diagnosis, and to urge—as he had already done and for which I had been summoned—an immediate operation. Lateral abdominal section was performed on November 6. The incision began an inch above the middle of Poupart's ligament, and was continued upward and outward four inches; on reaching the colon (the tissues were all normal so far) and turning it up in search of the appendix, an abscess was found which contained an ounce and a half or two ounces of very fetid pus. The appendix was found glued to the cæcum; it was enlarged, thickened, covered with lymph, and presented a perforation about a quarter of an inch from the extremity. In the perforation was found a small fecal concretion. A silk ligature was placed on the appendix close to its root, and the distal extremity was excised. The peritoneal cavity was then flooded with large quantities of recently-boiled water; a large glass drain was carried through the coils of the intestine to the bottom of the pelvis, and a rubber drain was placed in the abscess cavity alongside of the colon; then the wound was brought together with silk sutures, and a dressing, held in place by a four-tailed binder, was applied. Milk was given at short intervals, and the bowels were kept freely open by calomel and salines. Convalescence was uninterrupted. The

day following the operation there was great tension of the wound, and all the sutures were cut, leaving the wound gaping open. Peroxide of hydrogen worked like a charm in keeping the wound and drain sweet and clean and in assisting slough separation.

The rubber drain was taken out on the third day, and the glass drain worked out on the ninth day. The wound was closed on the twenty-eighth day, and the boy was about the house during the fifth week.

In presenting the foregoing cases, I feel warranted in making a few practical observations upon the operation of removal of a diseased appendix; its relations to typhlitis and peritonitis; and especially upon the time and indications for operation, with the details of treatment before and after operation. One thought naturally presents: it is, that only a short while ago, under the ideas then prevailing with regard to the treatment of such cases, each of the patients here presented either would have perished, or would be living in constant fear of the repetition of an attack which might at any time prove fatal. If we review the progress of this operation of exposing the diseased appendix and excising it, thus removing the cause of repeated attacks in simple or in perforative appendicitis, it is interesting to note the gradual development of the procedure.

Mr. Hancock, of London,\* in 1848, appears to have been the first to urge operative interference in perityphlitic abscess by free incision and drainage, but this did not meet with much favor until it

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\* London Medical Gazette, 1848, p. 547.



received the endorsement and able advocacy of Willard Parker,\* in 1867.

In 1878, Sands, of New York, was able to report twenty cases treated in this way, and in 1883, William Pepper, at a meeting of the Pennsylvania State Medical Society, presented the statistics of one hundred cases contributed by Noyes, of Rhode Island. From these, and numerous other contributions to the literature of the subject, it was fully and finally demonstrated that surgical interference in cases of so-called perityphlitic abscess largely reduced the mortality of this affection. This was a decided step in advance upon the old method of non-interference, which, strange though it may appear, is still advocated in some medical text-books. Surgical writers, on the contrary, now generally urge early operation, which, as has been shown, does not increase the risk to the patient, but places him in a position greatly more favorable to recovery.

After the remarkably successful abdominal surgery of Tait, Keith, and others had shown that the peritoneal cavity might be opened and explored with comparative impunity, it was but natural that surgeons should be led to apply the same rules to the treatment of perityphlitic abscess, and open it more freely than before; then to explore its cavity, examine the vermiform appendix, and to amputate this unnecessary and dangerous organ when the subject of appendicitis.

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\* Medical Record, New York, 1887.

or ulceration, whether perforating or not. This has been the final step in the operative treatment of perityphlitis.

To the diagnosis, indications for operation, and details of treatment before, during, and after surgical interference, I shall now direct attention.

*Diagnosis.*—One of the earliest and most constant symptoms of acute appendicitis is pain, which may be slight or stabbing in character, and usually is increased very much by pressure. It comes on in attacks or paroxysms (which may be years or months apart), during which there may be nausea and even vomiting, but not necessarily. The temperature is slightly elevated; constipation is commonly present; the pulse is generally accelerated; the ileo-cæcal region may be tympanitic, or it may be more or less dull. These symptoms sooner or later may disappear, and convalescence be established, but a relapse or recurrence would indicate that a source or irritation continues. After a variable period the attack is renewed, and perhaps with graver symptoms, or, during an apparently mild attack, the sudden advent of violent, local, and constitutional symptoms announces very positively the occurrence of inflammation of the appendix, with pus-formation, or peritonitis.

The fact of occurrence of an attack of appendicitis, although apparently entirely recovered from, is serious enough to give rise to apprehensions for the future; for the patient is liable at any time, from a blow, fall, undue exercise, straining, indigestion, or even without apparent cause, to have a

recurrence of irritation in the appendix, which may terminate in inflammation, ulceration, and perforation. The number of attacks or relapses or recurrences before ulceration takes place varies, but when several have occurred it is almost certain that the appendix is seriously diseased. After one or more attacks the patient may remain apparently well, but as a rule this is not the case, and attack upon attack at gradually shortening intervals very conclusively demonstrate that the appendix is the source of the trouble, and that perforation, if not actually present, is liable to occur at any time. The subject of such an attack may occasionally recover without surgical interference, through atrophy of the organ or adhesion to the cæcum with more or less complete obliteration of its calibre. But such a favorable result must be the great exception in the vast number of cases, and its occurrence in any given case cannot be depended upon.

In cases presenting the symptoms above mentioned, pain, tenderness, deep swelling, or tympanites in the appendix region, associated with prostration, nausea, fever, and constipation, these phenomena coming on suddenly, and especially where there has been a history of previous attack,—such an array of symptoms would warrant the diagnosis of appendicitis. When to these symptoms is added a sudden accession of intense pain increased on pressure in the right iliac region, with perhaps moderate pain over the rest of the abdomen, a fluctuating temperature reaching  $102^{\circ}$  or perhaps

higher, slight rigors or decided chills, moderate perspiration or decided sweating, and an increase of tympany over the pericæcal region, unquestionably there will be found pus.

It is also usual in abscess formation to have a dusky or sallow skin, an anxious expression, and prostration.

In a case presenting the symptoms of pus, with a history of former attacks of pain, or relapses, *it is certain that we have to deal with an abscess*, the result of appendix perforation.

In case of doubt, rectal exploration might be cautiously resorted to, but, owing to the sigmoid flexure being attached upon the left side, it would only rarely occur that this could yield any positive information.

In a small recent abscess it is scarcely probable that it could be discovered through the rectum, while if the abscess was large and encysted there would be no difficulty in detecting it through the abdominal walls.

The use of the aspirating needle I mention but to condemn. It should *never* be used, for, if it does not find pus we cannot be sure that none is present, while its own dangers are not inconsiderable. It is in these cases a poor and especially unsafe diagnostic resource.

*Differential Diagnosis—From Disease of the Cæcum.*  
—From disease of the cæcum the diagnosis of appendicitis cannot always be clearly made, so close is their relation; both giving rise to local disturbance in the right iliac region.

In the region under consideration we have the cæcum and vermiform appendix, both are invested through more or less of their extent with peritoneum; both organs are subject to irritation, inflammation, ulceration, and perforation. *While it is extremely rare to have a perforation of the cæcum,* it is just the reverse as to the appendix. Abscess around the cæcum *in almost every case is due to appendix disease;* even in those cases where cæcal perforations have occurred it is highly probable that they may have resulted from previous appendix perforation or disease. One such case came under my observation. On the second day after the removal of a gangrenous appendix, fæces came from the wound in considerable amount, and upon careful inspection two gangrenous perforations were found involving the anterior and lower part of the cæcum. At the time of the appendix-removal the cæcum and colon were somewhat impacted, and the violent inflammation about the appendix had extended to and involved the intestines, gangrene resulting, due in part to contiguous inflammation and also in part to *impaction*. But if this abscess cavity had been simply opened and the appendix not reached, the subsequent appearance of fæces would at once have established the diagnosis of simple cæcal perforation, while the appendix disease would have been overlooked. So that in supposed cæcal perforations, primary ulceration of the cæcum being extremely rare, the probability is that it is secondary to appendix disease.

Between perforative cæcitis and perforative ap-

pendicitis, the history of previous attacks of pain would make the diagnosis in favor of the latter; even without the history of relapsing typhlitis, it would be fair to accept the diagnosis of appendix disease, for cæcal perforations are exceedingly rare indeed, but three or four such cases have, it seems, been reported and verified by post-mortem. The necessity for abdominal section is the same in both, so that the diagnosis can be left open in cases of uncertainty until section is made.

*From Acute Intestinal Obstruction.*—A careful examination of the patient will usually exclude fecal impaction, intussusception of the bowels, internal strangulation, or volvulus. In ordinary fecal impaction there are no general symptoms, although there may be nausea or vomiting; there is no special pain or tenderness, and the outline of the colon can be made out by palpation. There is usually a history of increasing constipation for weeks or months previous. Intussusception is accompanied by frequent desire to empty the bowels, with discharges of mucus or blood; the tumor is sausage-shaped and is not very tender; and the true character of the case may often be discovered by rectal examination. In volvulus there is more pain, but it is referred to the neighborhood of the umbilicus; there is neither pain nor tenderness in the iliac region. Strangulation may be caused by diverticula and frequently by constriction bands, the sequence of former peritonitis. The intestines may be adherent to the omentum and become revolved upon it. In one case an adherent

appendix vermiformis strangulated the ileum. Obstruction may also be simulated by enteritis or peritonitis, owing to the paralyzing effect upon the bowel. When the obstruction is intestinal the symptoms advance very rapidly, even more so than in appendicitis.

*From Spinal or Perinephritic Abscess.*—Attention to the history of the case and to the local signs of disorder will enable us to diagnosticate these forms of abscess. The treatment being almost identical, at least as far as laparotomy is concerned, we need not waste much time in making refinements of diagnosis, although such diagnosis can generally be made. In the following case, it was not positively made until some time subsequent to the operation.

In November, 1888, I saw in consultation with Dr. Bartleson, of Clifton Heights, a young man twenty-eight years of age, who had been confined to his bed for three weeks, and presented symptoms of pus formation in the inguinal region. His temperature fluctuated between  $100^{\circ}$  and  $104^{\circ}$ ; he had sweatings and pronounced chills; yet the pain, which was local, was not severe, but it was increased by pressure. He had no history of former pain in the appendix region. There was, however, a tumor which could readily be made out, but at a considerable depth: I decided to explore this by operation. Incision opened into an abscess, but the cavity seemed closed, and it was not so deep as I had usually found in suppurative appendicitis. Neither the cæcum nor the appendix came into view, nor

could they be found in the cavity or its borders. The pus-cavity was drained, and subsequently closed. The case subsequently proved to be one of psoas abscess, originating in the lumbar vertebræ, but no positive diagnosis could be made for several months after operation, by which, nevertheless, he was completely cured of both abscess and the spondylitis.

In psoas abscess, especially in young children, some difficulty may be experienced, at times, in differentiating it from pericæcal inflammation. But in the former there is generally a history of long-present ill-health and pain in the dorsal region, usually with symptoms of vertebral disease (*i.e.*, gastric irritation, intercostal pains, constriction band, or pains in the thighs). The pains are colicky and associated with flatulence; and there is more or less pain or irritation of the bladder. Abscess from disease of bodies of the spine generally points in the groin, either just above or below Poupart's ligament; it is associated with a history of ill-health, and difficulty in walking. Iliac abscess may occur unconnected with the spine or cæcum, arising within the abdominal cavity near the spine. In such cases the symptoms of systemic disturbance are quite decided: chill, more or less pronounced, with hectic fever and night-sweating are very apt to occur. As soon as the existence of pus is recognized, an exploratory incision should be made in order to detect the source if possible.

*Tumors* may appear in this region, both malignant and non-malignant, and their nature may be in-



ferred from their physical characters and the clinical history, which shows their gradual increase in size, etc.

The history of the mode of onset or invasion of the disease will be of service in making its diagnosis. Strangulation of the bowel, intussusception, peritonitis, volvulus, generally come on very suddenly. Impaction of fæces, psoas or iliac abscess, and tumors come on gradually. Cæcitis and perforative ulcer of the cæcum are also more or less rapid in their course, and point superficially more quickly than does the abscess to which appendicitis gives rise.

*Treatment.*—The treatment of pericæcal inflammation, no matter whether its origin is in or about the cæcum or in the appendix, may be divided into two divisions: that of the pre-purulent and that of the post-purulent stage; or, first, before formation of pus or of appendix-perforation; and, secondly, after that event.

The treatment of the pre-purulent, irritative, catarrhal, or simple inflammatory disorders of the cæcum, its surroundings, or the appendix, should consist in absolute rest in bed, restriction of diet to nourishing liquids, hot poultices or fomentations frequently replaced upon the parts, perhaps local depletion, and possibly the hypodermic exhibition of morphine to control pain; while the bowels should be kept open and free from accumulations of gas and fæces by the administration of calomel or salines and enemas.

Prompt resolution should take place in cases

which are not to go on to the stage of pus-formation. Tedious recovery, relapse, or recurrence of symptoms, would point to the probable presence of conditions exceedingly dangerous to the patient from the liability to general peritonitis or perforation at any time, and further, they would point, as a rule, to the appendix as the source of irritation and danger.

That treatment of pericæcal inflammation which places the bowels "at rest" from the start, or in "splints," commonly so called, has probably been the cause of more serious, often fatal, results than can well be estimated. The use of opium without question masks the symptoms which indicate pus-formation, causing loss of diagnostic symptoms and of valuable time at a most critical period; the apparent improvement due to lack of pain, often causing postponement of operative interference until the patient is practically in a hopeless condition. Intense pain is more often an indication for operation than for morphine; the knife will remove both pain and danger and give radical relief for all time, as recurrence cannot occur when the cause of the malady, the appendix, has been removed.

In the second division, the process has gone beyond the simple irritative or inflammatory stage and pus has formed.

Pus in contact with, or in the cavity of, the peritoneum (and such is precisely the situation in abscess surrounding the appendix or cæcum) is vastly more serious than would be an abdominal

section for its relief. So, the diagnosis of pus having been made, and, indeed, often without positive diagnosis, operation is positively indicated; many other risks are to be taken rather than those of general purulent peritonitis, for early interference will save almost if not all cases from this much-dreaded complication, while the danger of operation becomes slight compared with that of general abdominal inflammation.

Local or general peritonitis supervening in a person who has a history of cæcal trouble would more than justify operation.

At a later, or even, perhaps, in the chronic stage of the disorder, all available diagnostic skill must be exerted when pericæcal abscess may have pointed in an anomalous situation, and we must ever adhere to the modern surgical rule, always to attack pus at its source if possible. When the cæcum is normally placed, this is always feasible, if the disease be recognized.

*Preparation for the Operation.*—There is generally, from the very nature of the case, very little time for any special preparatory treatment.

The field of operation should be made clean with soap and water, then shaved, washed with ether or turpentine, soapsuds again, and then douched with a mercuric bichloride solution (1 to 1000); the umbilicus having been carefully cleansed and its cavity rubbed with iodoform.

If possible, the disinfecting process should be completed some hours before, and the abdomen kept covered with a wet bichloride dressing. The

field of operation should be protected by towels wrung out of hot mercuric solution.

The instruments should be treated by boiling, and then kept in a three-per-cent. carbolic acid solution, or used from cooled boiled water.

The operator and his assistant—one is sufficient—should likewise observe the rules of strict antisepsis, which should rigidly prevail throughout.

*Operation.*—The line of abdominal incision should be lateral, not median. The advantages of the former are very obvious and positive. It is made directly over the appendix region and abscess cavity. If a median incision were made the peritoneal cavity would not only be often needlessly opened, but the section would be at a point remote from the cæcum and appendix, in a position in which they cannot well be reached. Indeed, it would often be quite impossible to deal with a diseased appendix unless the incision were lateral, for the difficulties experienced in bringing into view and separating this organ when it is firmly bound by adhesions to the cæcum, as is often the case, are not inconsiderable. If pus have gained access to the peritoneal cavity, or the intestines come to view, thorough cleansing can be effected as well by a lateral incision, while the sloughs of cellular and other tissues, which always may be expected from the abscess cavity and surrounding parts, can more readily discharge through an opening contiguous to the disease.

Usually there occurs within a few hours after operation great swelling of the wound and ileo-

cæcal region. This requires removal of the sutures ; the wound gapes and the cæcum is fully exposed, but the latter is held naturally in position, and there is no danger from intestinal protrusion ; drainage by such a free opening is proportionally favored.

The incision should be from four to six inches in length and correspond with the appendix region ; it should extend from an inch above the middle of Poupart's ligament upward through the right linea semilunaris and down until peritoneum, cæcum, or pus is reached. Occasionally pus is not discovered until the cæcum is displaced, when the abscess cavity and the appendix come in view. Bleeding should be arrested by the use of hæmodynamic forceps and the application of hot water.

I have found that the appendix is normally situated immediately under a point two inches distant from the right anterior superior iliac spinous process, on a horizontal line drawn from this process towards the median line of the body, so that this incision is directly over the organ. When the abscess cavity is reached, gas may be first discharged, then, when pus, which is always offensive, has been reached and sponged or washed away, the appendix is found either lying free or attached to the cæcum or abscess wall. It is not always an easy matter to distinguish the appendix ; on one occasion this organ and an epiploic appendage, both of the same size, and resembling each other in general appearance, were side by side and both firmly glued to the cæcum. The most inferior of these bodies

was correctly judged to be the appendix. The anatomical relations will always differentiate the appendix.

Irrigation with recently boiled or distilled water at a temperature of  $105^{\circ}$  to  $110^{\circ}$  gives a clear view of the surroundings of the cæcum and its appendix; at this time it may be necessary to enlarge the wound in order to obtain sufficient space to conduct the necessary manipulations; this will be found especially indicated when the appendix is more or less firmly glued to intestine.

The appendix is practically always found to be the seat of trouble; in any case it should be excised,—unquestionably so if swollen, inflamed, perforated, containing masses of fæces, or harboring foreign bodies.

The removal of the appendix after gently freeing it from any adhesions which it may have formed can best be accomplished by ligaturing it close to its cæcal attachment with a silk ligature, and excising it just outside the point of ligation. If the general peritoneal cavity has not been involved by the abscess nor during the necessary manipulations of excising the appendix, the abscess cavity should simply be washed out with a mercuric chloride solution (1 to 1000), and a good-sized rubber drainage-tube carried to the bottom of the cavity, and brought out near the most dependent part of the wound. In all of the cases which have come under my care the peritoneal cavity has been invaded by pus, either before or during the operation, so that the entire abdominal cavity had to be thoroughly

cleansed and drained. Irrigation of the abdominal cavity can best be accomplished by a fountain (or other form of) syringe, carrying sterilized water of a temperature of  $105^{\circ}$  to  $110^{\circ}$ . Every part of the abdominal cavity should be thoroughly and repeatedly drenched if pus has entered it.

Should far-advanced peritonitis be found, the intestines must be withdrawn, and all adhesions parted with the finger or knife during the process of cleansing and before they are returned to the peritoneal cavity.

In any abscess of the ileo-cæcal region we should always suspect appendix disease, and an effort should always be made to expose this organ. In no case should a simple evacuation of pus be considered sufficient, especially if the history of the case presented any account of probable, former appendix trouble. A case of this character came under my care, in which at first, in 1885, I simply evacuated an abscess situated in the ileo-cæcal region, and made no investigation of the appendix, as the abscess cavity seemed a closed one. Three years later I was obliged to make abdominal section and remove a diseased appendix, which undoubtedly had existed at the time of the first operation.

Cæcal perforations should be cleansed, curetted, and closed by Lembert suture. If this be difficult or impracticable from the position of the perforation or otherwise, no danger need be apprehended, for such fistules close naturally; one such complication occurred in a case in which I excised a sloughing appendix. At the time of operation

the cæcum seemed somewhat distended and its color unnaturally dark; forty-eight hours afterwards fæces were observed in the wound, which was sufficiently open to see a gangrenous perforation; the fistule gradually contracted, but continued discharging a small amount of intestinal contents for some months, when it permanently closed of its own accord.

If the inflammation should be found in the cæcum itself, due to the presence of a foreign body or to impaction of the fæces, they should be either excised or urged by prudent force along the bowel.

In their operative removal a simple incision, afterwards united by Lembert sutures, would answer every purpose.

When the general peritoneal cavity has been involved by the abscess, or broken into during operation, it requires, after cleansing, to be drained, and for this purpose a large, glass, perforated tube, slightly curved (Keith's) is carried down between the coils of intestines to the most dependent part of the pelvic cavity and allowed to emerge at a convenient point near the lower part of the wound. It is safer in all cases also to insert a perforated rubber drain to the bottom of the abscess cavity. The wound is then brought together by interrupted silk sutures.

A piece of protective tissue perforated for the tube exit is then applied to the wound. To the bottom of the glass tube is carried a cotton rope which absorbs the secretions, and over its outlet a wad of cotton is placed and enveloped in rubber



tissue in the usual manner. Iodoform is now dusted over the wound surroundings and a large dressing of wet bichloride gauze and cotton is then applied and held in position by a four-tailed flannel binder.

*Post-Operative Treatment.*—After the effects of the anæsthetic have passed off, a hypodermic injection of morphine may be required to relieve pain, or check vomiting or restlessness. The ordinary rules of abdominal surgery are to be observed. The cotton rope should frequently be changed, generally every three hours is sufficient for the first few days; before it is replaced the tube should be irrigated with boiled or distilled water, peroxide of hydrogen, or weak carbolic-acid solution, especially when, as is often the case at first, the secretions are more or less offensive.

Milk should be given at short intervals, and in small doses, and stimulants are, as a rule, early required; if there has been much exhaustion champagne should be freely given.

It is important that the bowels should be promptly opened and kept so; and for this purpose small doses of calomel should be given, say  $\frac{1}{12}$  or  $\frac{1}{6}$  of a grain hourly or half-hourly, with an occasional  $\frac{1}{8}$ -grain dose of podophyllin; after this salines can be substituted. Quinine and the malt extracts are strongly indicated. Opium should not be used in any form internally; morphine in small doses hypodermically rarely may be required subsequent to operation to relieve pain or restlessness, but should be regarded as a *dangerous agent* and used with great reluctance.

It will usually be found that the cellular tissues surrounding the abscess are hopelessly infected and necrotic, perhaps for a long distance; it will likewise be found impossible adequately to remove or cleanse them. Hence the wound will almost invariably run a foul septic course, great sloughs will keep coming away for many days, and it will eventually, in from six to eight weeks, heal firmly from the bottom by granulation and cicatrization. I have advised, nevertheless, that the wound always be primarily sutured, for by so doing and subsequently cutting suture after suture as the wound becomes tense, we secure an anchorage of the cæcum in the bottom of the wound by lymph exudate which prevents prolapse or hernia subsequent to cutting the sutures, or after cicatrization.

As a rule, one or two sutures must be cut at the end of twenty hours, others subsequently as tension may demand. When these are cut the already anchored cæcum, and perhaps other intestines, come into view as the wound widely gapes, but they show no tendency to prolapse even when the patient strains or coughs, although the latter—indeed all active motions—are to be strenuously avoided.

The gaping wound should be packed with strips of gauze, which are to be frequently changed and the parts cleansed with peroxide of hydrogen until the tubes are away and the granulations approach the surface, then adhesive straps are used to approximate the wound edges. A binder, or good abdominal belt, must be worn for six months or a year after complete closure of the wound.

*Symptoms of peritonitis after operation* should be met by free saline purgation (Epsom salts hourly or half hourly) or by reopening and washing out the abdomen.

The time for the removal of the glass pelvic drain will depend altogether upon the amount and character of the secretion; usually it can be dispensed with by the fifth or sixth day, but frequently is retained until the tenth or twelfth. It is commonly forced out by the action of the intestines at the proper time. When it is removed, it is well to introduce in its place a small rubber drain, which can be each day brought nearer the surface and then cut away piecemeal.

The dressings should be replaced as often as they become soiled, and this is generally every six or eight hours for the first few days, afterwards at longer intervals.

I have thus gone over, in a more or less brief manner, the symptoms which should guide in making the diagnosis of appendicitis and pus formation in or about the pericæcal region, and have presented in as strong a manner as possible the necessity, in such event, for early operative interference.

The details of the operation and post-operative treatment have been given with some minuteness, and this seems proper, because such specific directions have not been published.

In conclusion it may be said that although abdominal surgery can show many brilliant achievements, yet scarcely in any other instance does an

operation so completely afford its own justification, or, when properly timed, present such satisfactory results, as laparotomy when performed for perforative appendicitis.

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### A D D E N D U M.

The preceding paper, it will be observed, has been confined strictly to a consideration of *acute* forms of appendicitis. It is proposed in this additional note to consider in brief the subject of surgical interference with chronic appendicitis and those conditions which give rise thereto.

I have long been an advocate for removal of the diseased appendix in the interval between acute attacks; indeed, so long ago as in my first writing upon this topic, I urged that recurring attacks of appendicitis or perityphlitis should be considered an absolute indication for removal of the appendix; preferably after entire subsidence of an acute paroxysm, when every condition is so much more conducive to prompt recovery, and primary healing of the wound. I would now again aver that recurring attacks, or persistent chronic appendicitis, whether due to protraction in milder degree of the acute seizure or even originating and continuing without intercurrent acute attacks, not only justify operation, but absolutely demand excision of the appendix to insure the future safety of the patient. For it must now be acknowledged that recurring attacks of appendicitis usually, sooner

or later, eventuate in that most dangerous of acute affections, perforation of the organ and pericæcal abscess, which, as likely as not, will take place when the person is situated where adequate medical relief cannot be had. How much better, then, to place him at once and for all time beyond the possibility of danger from this source, by a comparatively trivial operation at a time and under conditions when prompt and permanent relief and recovery can almost invariably be secured!

A study of the pathology of appendix disease shows that many cases commence as ulcerations of the mucous membrane of the appendix, which, with or without the formation and presence of concretions, progress to perforation, and, in either case, originate symptoms of intermittent or continuous chronic—perhaps disabling—appendix inflammation; and, earlier or later, either in the primary or a subsequent attack, give rise to perforation, abscess, and, when improperly dealt with, to death.

I would, then, reiterate my belief that symptoms of continuing appendix disease, whether continuing after acute attack, or due to primarily chronic disease, or simply indicative of ulceration of the lining mucous membrane of the appendix, invariably demand excision of the offending organ.

All of the various distressing and often disabling symptoms of the various appendicular disorders, including those arising from inflammatory adhesions of the organ to neighboring viscera, are relieved, as if by magic, by excision of the appendix. This has been amply proved by the brilliant cases

of Treves, Senn, Hoegh of Minneapolis, Bernardy, and Shober of Philadelphia.

*Operation for Chronic Appendix Disease.*—The premeditated operation permits the careful preparation of the patient beforehand by rest in bed, regulated diet and bowels, and thorough general and local disinfection.

Incision should be made directly over and carried down through the right linea semilunaris. It should be at least three inches in extent and should be enlarged as may be required for necessary manipulation. After the peritoneum has been exposed to the full length of incision, all bleeding points are carefully ligatured with fine catgut and the wound is sponged entirely free of blood or other fluid. Now the peritoneum is incised. If the appendix does not at once present in the wound it will be necessary to press the intestine upward with the finger. If, as may happen, the appendix is found to be partially or wholly attached to the cæcum or elsewhere, the adhesions must be separated by the finger, or, if strong, be divided between double ligatures. The appendix may be entirely free of mesentery or the latter may extend throughout its whole extent; if so, this, as it were, meso-appendix must be ligatured in portions and cut through between the ligatures and the appendix. The latter organ is then included in a ligature at its cæcal origin and cut off.

A number of methods have been adopted for dealing with the resulting stump of the appendix. If it is to remain projecting from the cæcum, the

cæcal peritoneum should be brought over it and there united by Lembert sutures.

Although I have had no experience in the removal of the appendix for chronic disease, yet, from experiments made upon the cadaver with a view of getting entirely rid of the stump and hence of all subsequent danger from it, I have found that it can very readily be inverted and completely invaginated into the cæcal cavity.

The proposed manipulation consists, after ligaturing and cutting away the appendix, in grasping the stump at its distal extremity with forceps and pushing it into the cæcum; the peritoneum is then approximated over the inverted stump by means of three or four Lembert sutures which retain it in the cæcum, and effectually prevent its subsequent prolapse.

This is easily accomplished, and absolutely removes all source of danger from any future irritation in the *cul-de-sac* or that part of the appendix between the point of ligation and the cæcum. After the parietal wound has been carefully sponged and all clots removed, it is brought together by two rows of interrupted sutures,—a deep set for the closure of the peritoneum, and a superficial series to unite the edges of the external or skin-and-muscle wound. Drainage is not necessary unless under very exceptional circumstances. The external wound is to be dressed after the usual method, as previously described.

The diet for the first few days should be confined to liquids, especially milk, often and in small

quantities. The bowels (which are supposed to have been opened well upon the morning of operation) need not be disturbed for two or three days, when they should be stimulated to gentle activity by mild mercurial or saline laxatives. The dressings need not be disturbed for a week or ten days, when the sutures—if of silk—should be removed. A supporting binder or abdominal belt should be worn until the cicatrix is quite firm.







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